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METRO-EAST REGIONAL WASTEWATER TREATMENT ASSOCIATION

ENVIRONMENTAL ASSESSMENT

Metro-East Regional
Wastewater Treatment Facility

Prepared By:

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SUMMARY

ENVIRONMENTAL ASSESSMENT

1. Type of Action: Administrative

2. Description of Action Indicating Area Affected: Proposal requests that funding be granted for construction of a regional wastewater treatment facility in Sauget, Illinois to provide secondary treatment for the effluent from four primary treatment plants in the Metro-East area (East St. Louis, Lansdowne, Cahokia and Sauget).

3. Summary of Environmental Impact and Adverse Environmental Affects: The major impact of the proposed advanced wastewater treatment project is improvement of the quality of effluent discharged to the Mississippi River. No significant biological, physical, or socio-cultural disruptions are anticipated during construction or operation of this project, thus there will be no adverse environmental affects.

4. Alternatives Considered: (a) regional versus individual secondary treatment; (b) activated sludge system utilizing dissolved air flotation thickeners, heat treatment units and vacuum filters for sludge dewatering followed by landfill on-site; (c) same system utilizing incinerators instead of heat treatment units; (d) primary sludge handling at regional secondary facility and at individual primary plants; (e) transport of primary effluents and sludges from primary plants via gravity or force mains and pipelined slurries or trucked sludges. These alternatives are detailed in the Engineering Feasibility Report.

5. Federal Agencies from Which Comments Have Been Requested: Federal EPA, Illinois EPA, Illinois Water Pollution Control Board, East-West Gateway Coordinating Council, Southwestern Illinois Metropolitan Area Planning Commission (SIMAPC).

I. DESCRIPTION OF PROPOSED ACTION

The Metro--East Regional Wastewater Treatment Association proposes that a regional wastewater treatment facility be constructed in Sauget, Illinois to provide secondary treatment for the effluent currently discharged directly from four primary treatment plants in the metro-east area (East St. Louis, Sauget, Cahokia, Lansdowne).

The existing wastewater facilities in the study area are unable to produce an effluent in compliance with Illinois discharge requirements which will become effective on December 31, 1974. The proposed plant would assure such compliance, thus fulfilling state criteria and providing local coordination with state water quality management plans. It would also fulfill wastewater treatment needs specified in long-range comprehensive water-sewer plans formulated by SIMAPC.

The proposed facility will handle a combined design flow of 37 mgd based on the component flows from the four plants. The peak flow is estimated at 51 mgd. A completely mixed activated sludge system with a detention time of 8-10 hours will be utilized to insure 90 percent removal of BOD and 85 percent removal of suspended solids. Settling tanks will have a detention time of three hours after which the sludge is air-lifted and transferred to sludge thickeners. Effluent from the settling tank will be taken to the chlorination basin where chlorine contact duration will be minutes. The chlorinated waste is further treated in microstrainers where remaining BOD and suspended solids are reduced by 90 percent.

The sludge handling process of the system is unique because the secondary sludge will be combined with the primary sludge from East St. Louis, Cahokia and Lansdowne. The sludge will be thickened and given heat treatment. The final process will be vacuum filtration followed by hauling the inert sterilized materials for landfill. The sludge from Sauget will not be handled with the other sludges because it contains metal hydroxides which should not be landfilled in the flood plain.

The proposed plant will be located east of the Sauget primary treatment facilities in St. Clair County, Illinois, on a 50+-acre plot owned by the Village of Sauget (see Site B, Plate 1). The site is about 1,000 feet west of Highway Route 3 and about 2,000 feet east of the Mississippi River. A newly proposed route for Highway 3 would run near the southern boundary of the site. The plot is presently bounded by the Terminal Railroad line to the east and the Gulf Mobile and Ohio railroad yard to the west. The

METRO-EAST REGIONAL WASTEWATER TREATMENT FACILITY STUDY

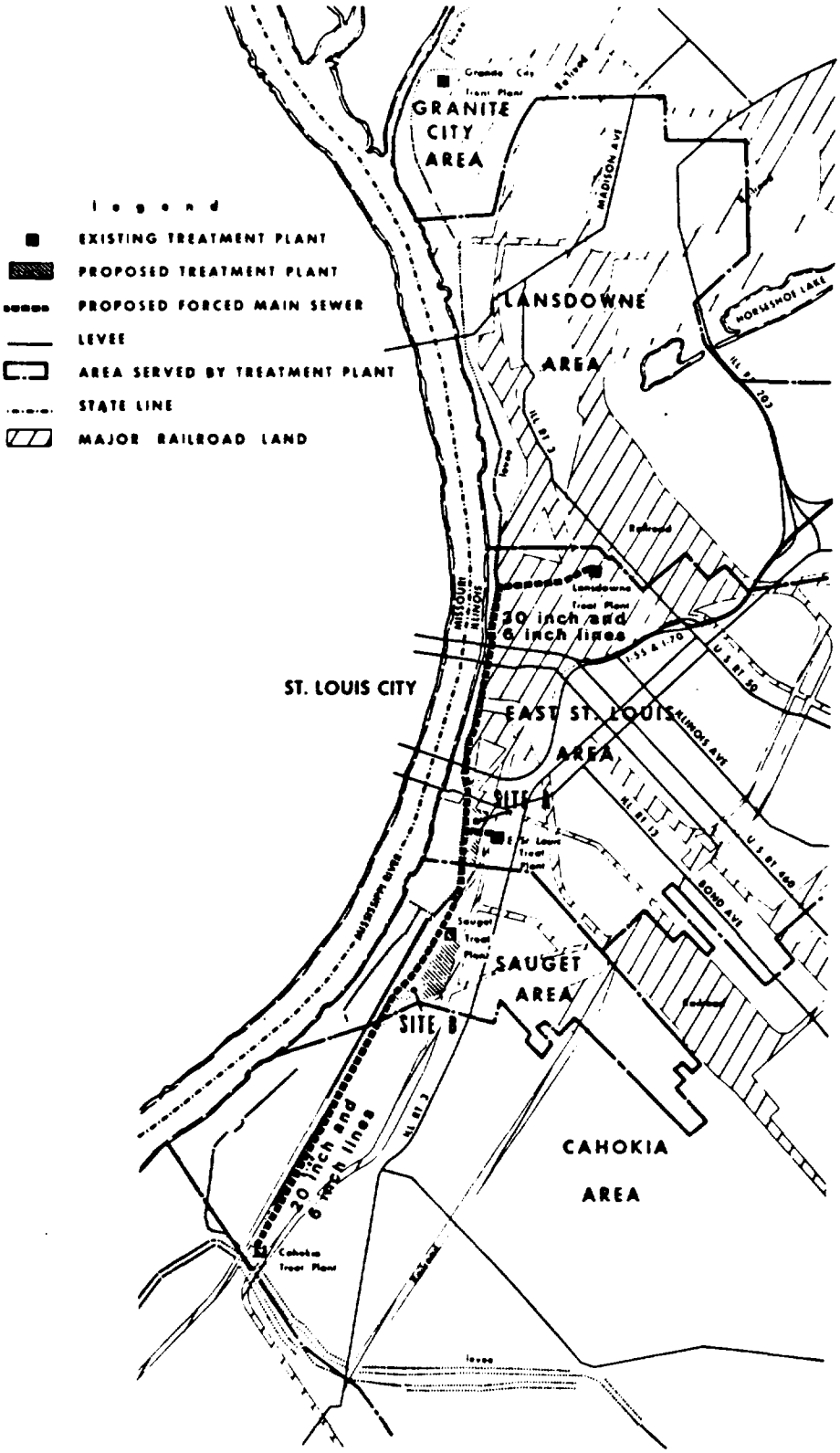

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PLATE 1

northern boundary will be about 2,000 feet from Monsanto Avenue while the southern boundary would be about 1,000 feet from the Alton and Southern railroad line. This area is zoned for industrial purposes and consists largely of commercial warehouses and factories. The site itself has no buildings on it. Future land use in the immediate area is expected to continue along similar lines.

Current population figures and population projections for the areas to be served by this facility are shown in Table 1. "The 2010 figures anticipate massive redevelopment prompted by central location, depreciating property values that will be irresistible, rapid transit service, rejuvenation of St. Louis as a railroad center and major river port, etc."*

All of the four primary treatment plants will require modifications or enlargement over the present operating conditions to accommodate the 1995 projected flows. The present facilities are described below.

1. Lansdowne Facility - The present plant provides primary treatment for an 18 square mile area north of the City of East St. Louis. The plant was designed to receive an average flow of 6.0 mgd of wastewater. The sanitary and industrial wastes from the plant's tributary area are pumped into the plant by two pumping stations. The primary sludge is anaerobically digested and deposited in two sludge lagoons.

2. East St. Louis - The present plant is designed to receive an average flow of 18 mgd with peak capacity of 30 mgd. There are two interceptor sewers serving the City of East St. Louis. One interceptor is a 10.5 foot diameeter, circular sewer while the newest interceptor is a 12.5 feet square structure. A low level dam, constructed in the 12.5 foot box and sewer downstream from the plant wetwell, diverts the dry-weather flow to the treatment plant. The plant effluent is discharged to the Mississippi at river stages less than 19 feet (St. Louis gauges).

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*SOURCE: SIMAPC, Water Quality Management Interim Plan, East St. Louis Intensive Study Area. Collinsville, Illinois, 1972.

TABLE 1

POPULATION PROJECTIONS

	1970	1972	1980	1990	1995	2010
Lansdowne (Including Venice and Madison)						
SIMAPC	31,629	--	--	35,917	--	42,400
RETA	--	33,315	35,155	--	38,476	--
Cahokia						
SIMAPC	39,128	--	--	45,270	--	50,760
RETA (Sewered)	--	39,742	42,199	--	46,643	--
East St. Louis						
SIMAPC (T.P.)	73,913	--	--	74,568	--	91,118
RETA	--	73,979	74,243	--	78,706	--
Sauget						
SIMAPC	220	--	--	--	230	240
Industrial (population equivalent)*	187,500**	--	80,000	--	115,000	--

*100 gpd/capita.

** 1971.

Under storm conditions sewage overflows the low level dam at the plant wetwell and is discharged into the river or directly into the East Side Levee and Sanitary District pumping station without treatment. The sludge lime from the primary plant is conditioned with lime and applied to vacuum filters. Sludge from the vacuum filters is disposed in a landfill. An interim chlorine disinfection system is presently being designed to treat the primary effluent before discharge to the Mississippi River.

3. Village of Sauget - A new primary treatment system has been designed to provide chemical treatment to the projected wastewater load of the Village. The process, which includes the addition of dolomitic limestone to a pH of 8.5 followed by coagulation and floculation prior to clarifications are under review by the Illinois EPA. The system is designed to handle a flow of eight mgd and a maximum of 11.5 mgd. Storm water overflow including first flush will be treated. The excess storm water overflow, up to 28.5 mgd, will receive primary treatment and will then be discharged to the river.

4. Cahokia - The Cahokia plant was designed to provide primary treatment of a three mgd flow. The sludge from the primary system is digested in two anaerobic digesters. Two sludge lagoons, with a total capacity of 1,380,000 cubic feet, are available for the storage of digested sludge.

II. ENVIRONMENTAL IMPACT OF PROPOSED ACTION

A. Engineering Geology and Hydrology - The East St. Louis study area lies along a Mississippi River flood plain commonly referred to as the American Bottoms. The American Bottoms extend from Alton to south of Cahokia and east from the Mississippi River to Caseyville and Collinsville in Illinois. The area covered is approximately 175 square miles.

The American Bottoms is part of the Till Plains section of the Central Lowland Physiographic Province. The topography and, therefore, the drainage slopes gently west to the Mississippi River. The average elevation ranges from 415 feet (MSL) at the north end of the bottoms to 405 feet (MSL) near Cahokia. Maximum relief is approximately 25 feet. Principal drainage tributaries to the Mississippi River includes the Wood River, the Cahokia Division Channel, the Cahokia Canal and the Prairie DuPont Floodway. Secondary drainage is provided by Schoenberger Creek, Canteen Creek, Lansdowne Ditch and the closed sewer systems of the various sewer districts in the East St. Louis area.

The flood plain is composed of valley fill which ranges from 0 to 170 feet in thickness.[1] In the study area, the fill ranges from 80 to 120 feet in thickness and is underlain by Mississippian and Pennsylvanian dolomites and limestones. It is composed of recent alluvium and glacial valley drain materials. The alluvium is largely comprised of fine grained silts and clays while the valley drain material is made up of medium to coarse grained sand and gravels which tend to increase in grain size with depth. The valley fill also contains lenses of organic materials which are usually found in the alluvium.

The soils found in the study area are typical bottom land soils which have been identified as Drury Fine Sand Loam, Beaucoup Clay Loam, Newart Silt Loam, Gorham Clay, Dupo Silt Loam and Riley Fine Sand Loam.[2] All of the soils exhibit a wide range of physiological characteristics.

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[1]Baker, W.H. Groundwater Development in East St. Louis Area, Illinois. Illinois State Water Survey, 1972.

[2]Smith, G.D. and L.H. Smith. St. Clair County Soils. University of Illinois Agricultural Experiment Station, Soil Report 63.

The Riley soil is found in the area between Cahokia and Sauget. It is a thin sand loam soil which rarely exceeds 10 feet in thickness. Permeability is high except where clay lenses occasionally occur and surface drainage tends to be rapid.

The Drury soil exists as a narrow strip along the Mississippi River. It is approximately seven feet in thickness and is composed of medium to coarse grained sand. Permeability is rapid but because of the generally shallow relief and proximity to the river, surface drainage rates may vary.

The Beaucoup, Newart, Gorham and Dupo soils cover the remainder of the area. They generally range from clay loam to silt loam and are rarely more than four feet thick. The permeability is generally low and surface drainage is slow.

Ground water in the valley fill occurs under leaky artesian and water table conditions.[3] The elevation of the piezometric surface as of November 1971 can be seen in Baker, W.H., Ground Water Levels and Pumpage in the East St. Louis Area, Illinois, 1967-1971. Recharge of the area occurs by precipitation and infiltration from the Mississippi River and its tributaries. Ground water levels generally drop in late spring, summer and early fall when precipitation decreases and river stages fall. This lowering of the water level is accelerated by the large amount of ground water that is pumped in the East St. Louis area. This pumpage may lower the water levels by 10 to 20 feet.[4]

Construction problems which relate to the geology and hydrology of the area are primarily due to the variability of the soil, the high water table and flood potential. The flood potential of the proposed site is low because of the protective levee, two primary stations and good surface drainage. Note that the record floods of March and April 1973 did not inundate this site. Average ground water depth is approximately 20 to 25 feet below the surface.

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[3] Ibid.

[4] Reitz, G.E. Ground Water Levels and Pumpage in the East St. Louis Area, Illinois, 1962-1966. Illinois State Water Circular 95.

Construction problems relating to soil variability usually involve foundation deterioration caused by settling, expansion of clay materials, undermining of foundations and soil flow. In most cases these problems can be minimized by the use of adequate pump-drainage systems, oversized excavations partially filled with competent materials such as gravel, and the use of piles.

Soil borings have been made by the U.S. Army Engineers (1969) through the levee on the Monsanto Property, approximately 400 feet north of the proposed site. The borings show that poorly sorted sands and gravels exist at about 395 feet MSL. This is approximately 10 feet above the average ground water table and about 10 feet below the surface. The surface soil consists primarily of Riley Lime Sand. This is a thin sand loam found between Cahokia and Sauget. In general, the permeability is high and surface drainage is rapid. However, lenses of clay occasionally occur and the ability of the soil to transmit water may be affected.

The poorly sorted sands and gravel that exist 10 feet below the surface provide a good foundation base for the proposed plant. In addition, since the site is above the average water table, good drainage is also assured. Hence, during construction, excavation will be oversized, will extend to the sand and gravels and will be partially filled with crushed rock or gravel. This method would insure adequate drainage and minimum settling as well as minimizing problems associated with expansion of clay beneath the foundations. Oversize excavation would be more economical and more effective than other methods such as drilling relief wells or the use of piles.

Construction and operation of the facility will result in minimum disruption of the area. At the present time, there are no trees or unique vegetation on the site. The relief is gently sloping, therefore, surface waters are not turbulent and grass seeding of the site will be adequate to control erosion.

The operation of the sewage treatment plant will be beneficial to the area's environment in the sense that it will control and reduce the amount of harmful waste introduced into the Mississippi River. Sludge created by the treatment plant will be disposed of at on-site landfills utilizing methods approved by the EPA. Heat treatment of the sludge prior to disposal will minimize the amount of organic substances introduced into the landfill.

B. Impact on Water Quality - The proposed project will improve the quality of the effluent discharge by providing an activated sludge, biological waste treatment process. Such pollutants as biochemical oxygen demand, chemical oxygen demand, suspended solids, nutrient elements, and heavy metals concentration will be greatly reduced to meet the effluent requirements of the State of Illinois. As a result, the receiving waters of the Mississippi River will be enhanced by this facility, with a corresponding improvement in the aquatic ecosystem.

Existing water supplies will be unaffected by the proposed treatment facility. The water table in the area is sufficiently high for adequate supply of ground water to industrial, municipal and agricultural sectors of the community. Thus there is no need to use ground water recharge and no incentive for any industry to pay the costs of pumping effluent for reuse. For similar reasons, little consideration has been given to spray irrigation or other surface disposal of the effluent. Thus, the treated effluent will be directly discharged to the Mississippi River without recycling or reuse.

C. Impact on Air Quality - The treatment plant will utilize a heat treatment process prior to vacuum filtration to sterilize the sludge before landfill. Thus, no odor problems from sludge disposal are expected. The landfill operation will be carried out according to EPA regulations to avoid any hazardous effects. No air pollution is anticipated from the other processes in the plant if it is properly run.

D. Impact on Ecological Systems - The proposed site is located in an industrial zone where wildlife is practically nonexistent. Hence, it is not anticipated that the area's ecological systems will be impaired in any way. As noted earlier, the habitat of aquatic life forms in the Mississippi River will be enhanced as a result of the improved quality of the discharged effluents.

E. Impact on Socio-Economic Factors - The proposed site for the regional facility is presently a barren, undeveloped industrially-zoned lot surrounded by heavy industrial development. Construction of the treatment plant will not require the relocation of either commercial or

residential populations nor will it destroy any archeological or historic sites. The facility as designed will be architecturally compatible with neighboring buildings and will be landscaped to provide an aesthetically pleasing appearance. Public health and welfare will be enhanced by the improvement in the effluent discharged to the Mississippi as will recreational possibilities, i.e., whole body contact. The proposed plant is not expect to produce any significant noise levels.

F. Mitigating Measures in Proposed Action - Construction and operation of the proposed facility will have no adverse environmental effects and will not result in any loss by the public of any privileges currently enjoyed. Therefore, no mitigation measures are appropriate or planned.

III. ADVERSE AFFECTS WHICH CANNOT BE AVOIDED

The proposed treatment facility has been designed to improve the water quality of the receiving stream with minimum disruption of other environmental factors during construction and operation. As a result, no significant adverse affects on the environment are anticipated from this project.

IV. ALTERNATIVES TO PROPOSED ACTION

The alternative site being considered (Site A) is just south of the East St. Louis primary treatment plant. The Gulf Mobile and Ohio railroad lines run along its eastern boundary about 1,500 feet from Illinois Route 3. Its southern boundary line is also the boundary between East St. Louis and Sauget. The levee is located at the western boundary, about 1,500 feet east of the Mississippi River. To the north is the Southern Railroad line. The site consists of about 35 acres and lies in the City of East St. Louis. The major portion of the site is owned by Southern Railroad.

The owners of the property have indicated that they are unwilling to relinquish the land. The location of the treatment plant on this site is therefore a relatively remote possibility. At any rate, the environmental assessment for this site is very much the same as that for the proposed site.

Alternative treatment processes have been considered, but cost effective analysis has led to their rejection. The major alternative is the installment of incinerators to replace the proposed heat treatment unit for the sludge dewatering process. Should the incinerators be utilized, they will be provided with afterburners and wet scrubbers as integral parts of the design. These measures will insure that odors and particulates do not become a problem. The used scrubbing water will be recycled to the head end of the treatment plant to remove solids scrubbed from the wet gases.

To determine a cost effective solution to wastewater treatment in the Metro-East area, the following alternatives were considered:

Case I - Storm water overflow, modifications and secondary treatment provided for each of the four primary plants at the individual locations.

Case II - The primary effluent from Lansdowne, East St. Louis, Sauget and Cahokia given secondary treatment along with storm water overflow treatment and modifications made on each primary plant to handle the projected flows. Regional sludge handling is included in this alternative.

Case III - The primary effluent from Sauget and East St. Louis given secondary treatmetn with treatment for Cahokia and Lansdowne located at each individual plant. Storm water overflow treatment provided and modifications made at each primary plant to handle the projected flows.

Case IV - Secondary treatment provided for the primary effluents from East St. Louis, Cahokia and Lansdowne in a regional facility with secondary treatment at Sauget for its wastewater and storm water overflows. Modifications made at each primary plant to accommodate the projected flows.

Each of the systems was designed to handle projected flows, biochemical oxygen demand, and suspended solids load as well as to meet Illinois effluent criteria. Storm water overflow systems were considered in all cases as well as sludge handling which would involve heat treatment or incineration with landfill of the sterilized sludge or ash. A sludge lagoon was not recommended. Because of the variability of the influent waste flows from domestic and industrial sources, complete mix activated sludge systems are recommended in several of the processes.

The projected composite wastes from the primary plants defined by components for the design year of 1995 are shown in Table 2. The average daily design flow for the regional secondary plant is 37 mgd; however, most of the maximum daily flow (262.2 mgd) which results from rainfall and high river stages will be handled most cost effectively by storm water treatment systems at the primary plants.

Because of the large variations in influent characteristics caused, in part, by the industrial components, the biochemical oxygen demands and suspended solids loadings shown in Table 3 were specified for a conservative analysis of the various regional treatment alternatives.

A summary of the estimated capital costs along with the operating and maintenance projections are shown in Table 4. It can be seen that Case II is the more cost effective alternative, a conclusion also reached by SIMAPC. A more detailed description of the alternatives is provided in the Engineering Feasibility Report.

To obtain a cost effective solution for regional secondary treatment, several special problems must be addressed, in particular the storm water overflow. The Village of Sauget has decided to provide facilities at the primary treatment plant to handle all flows in excess of 11.5 mgd (the maximum projected dry weather flow) which, for Case II, leaves a maximum combined daily flow of approximately 51 mgd for a regional design of 37 mgd. Plans are presently underway to construct the storm water overflow system at the Village of Sauget; the costs associated with this facility are shown in Table 4.

The great variability in flow constituents from industries result in variations in the effluent quality; therefore, tertiary treatment in the form of microstrainers is recommended. The regional treatment system with its greater flow volume serves an additional function as an equalization system for highly variable flows.

It was noted that the East St. Louis wastes contained very high levels of dissolved and colloidal iron. The cost effective solution is to treat the waste at the industrial source where it is concentrated and there are relatively low flow rates. The total dissolved solids levels in both the East St. Louis and Sauget wastes are greater than the allowed increase over the background. It should be noted, however, that a significant portion

TABLE 2

PROJECTED WASTEWATER FLOWS AND CHARACTERISTICS
TO THE PRIMARY PLANTS FOR 1995

	Average Daily Flow (mgd)	Average BOD_5 (mg/l)	Average TSS (mg/l)	Maximum Instantaneous Flow (mgd)
Lansdowne	6.2	286.7	233.5	23.4
East St. Louis	18.0	175	260	180.0
Sauget	8.0	220	35	40.0
Cahokia	4.8	154	109	18.8
Totals	37	201	187	262.2

TABLE 3

BOD_5 AND SUSPENDED SOLIDS LOADING

	BOD_5 (mg/l)	TSS (mg/l)
Case I	220	200
Case III	220	200
Case IV	220	250

TABLE 4

ESTIMATED CAPITAL COST AND OPERATING AND MAINTENANCE PROJECTIONS

	Capital Cost	Annual Operation and Maintenance Costs*
Case I	$39,077,800	$3,717,250
Case II	32,257,650	2,763,600**
Case III	33,630,100	3,283,100
Case IV	37,465,580	3,468,900

*Includes debt service on 25 percent of capital cost (six percent over 20 years)/ does not include operating and maintenance costs for primary treatment.

**The overall cost of operating and maintaining the regional and primary plants can be reduced approximately $150,000 annually by a combined management.

of the dissolved solids results from pollution abatement practices and that the level would be reduced with source treatment of the wastes containing iron. In no event did the level of dissolved solids in the treatability study exceed 3500 mg/l.

It has been indicated that municipal ordinances will be enacted to insure that the source of these effluents will be controlled to comply with Illinois discharge standards.

V. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Improvement of area water quality will be both the short- and long-term benefits of the proposed facility. Public health and safety will be enhanced by this improvement since the bacteria, solids, chemicals and other undesirable elements currently discharged to the receiving stream will be significantly reduced. In comparison with the past history and alternative uses of the land (industrial development), the proposed facility offers a comparably valuable service to the community.

Since the site chosen is currently owned by the Village of Sauget and may be donated free of charge, no individuals or organizations will financially profit or suffer losses from this use of the land. The proposed project is believed to be justified at this time in order to meet Illinois discharge requirements which become effective in the near future.

VI. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irretrievable resources involved in this action would include land, money and materials used in construction of the treatment plant. Plant construction and operation will not curtail use of the area to an extent greater than that incident to other industrial facilities in this locale.

VII. CONSULTATION WITH GOVERNMENT AGENCIES

This draft statement has been submitted to the following agencies for review and comments: Federal EPA, Illinois EPA, Illinois Water Pollution Control Federation, SIMAPC, East-West Gateway Coordinating Council.

Public hearings will be held as soon as possible after the assessment and applications have been filed.